

TITLE OF THE INVENTION

CRT ASSEMBLY OF PROJECTION TELEVISION

CLAIM OF PRIORITY

This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my application *CRT ASSEMBLY OF PROJECTION TELEVISION* filed with the Korean Industrial Property Office on 12 August 2000 and there duly assigned Serial No. 00-46766.

BACKGROUND OF THE INVENTION

Technical Field

The present invention relates to a cathode-ray tube (CRT) assembly of a projection television system, and more particularly, to a CRT assembly of a projection television having a pressure regulating structure for controlling the pressure of a cooling liquid for dispersing heat generated by the CRT.

Description of the Related Art

A projection television has been used for displaying an enlarged image on a screen. The enlarged image is projected from a cathode-ray tube (CRT) assembly including a CRT, a projection lens, and a coupler disposed between the CRT and the projection lens to couple the projection lens to the CRT. In order to disperse heat generated from the CRT, a cooling liquid receptacle and a

1 pressure receptacle chamber are provided in the coupler.

2 As an effort of providing a pressure receptacle chamber, U.S. Patent No. 4,777,532 to
3 Hasegawa entitled *Receiver Projection Apparatus for A Projection Television* shows a conventional
4 projection television having a pressure regulating chamber. The greater detailed structure of the
5 conventional projection television is described in the detailed of the Invention.

6 The conventional CRT, however, involves drawbacks that the structure of the coupler and
7 the pressure regulating chamber is complicated due to structural elements fixed to coupler and that
8 the manufacturing cost is high due to the large member of parts and the large member of assembling
9 steps.

SUMMARY OF THE INVENTION

10 To solve the above problems, it is an objective of the present invention to provide a cathode-
11 ray tube (CRT) assembly of a projection television having an improved structure for controlling the
12 pressure of a CRT cooling liquid contained within a cooling liquid receptacle of a coupler.

13 It is another object to provide a CRT assembly having a pressure regulating pack able to be
14 placed in a narrow space within a projection television.

15 It is yet another object to provide a CRT assembly having a flexible pressure regulating pack
16 to be easily assembled into the CRT assembly.

17 It is still yet another object to provide a CRT assembly having a pressure regulating pack able
18 to reduce the member of parts and the manufacturing cost.

19 To achieve the above objective, the present invention provides a CRT assembly of a
20

1 projection television including a CRT for creating an image, a screen, a coupler, disposed between
2 the CRT and the lens, a cooling liquid receptacle formed in the coupler and filled with a cooling
3 liquid, a cooling liquid pouring inlet disposed on one side of the couple to provide a passageway for
4 the cooling liquid poured into the cooling liquid receptacle, and an oilpack connected to the cooling
5 liquid receptacle so that a portion of the cooling liquid is contained in the oilpack when the cooling
6 liquid filled in the cooling liquid receptacle expands by heat generated from the CRT.

7 BRIEF DESCRIPTION OF THE DRAWINGS

8 A more complete appreciation of this invention, and many of the attendant advantages
9 thereof, will be readily apparent as the same becomes better understood by reference to the following
10 detailed description when considered in conjunction with the accompanying drawings in which like
11 reference symbols indicate the same or similar components, wherein:

12 FIG. 1 is a schematic cross-sectional view of a general projection television;

13 FIG. 2 is a cross-sectional view of a conventional cathode-ray tube (CRT) assembly of a
14 projection television ;

15 FIG. 3 is a perspective view of a CRT assembly of a projection television according to the
16 principle of the present invention;

17 FIG. 4 is a schematic cross-sectional view of the CRT assembly of a projection television
18 shown in FIG 3;

FIG. 5 is a partially exploded perspective view of a main portion of the CRT assembly of a projection television shown in FIGS. 3 and 4, and

FIG. 6 is a cross-sectional view showing a CRT assembly of a projection television according to another embodiment of the invention, in which a pack holder is coupled to a coupler.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 shows a projection television. An image produced and enlarged by a small letter Cathode-ray tube (CRT) assembly 4 installed within a main body 1 is reflected by a reflecting mirror 2 and projected onto a screen 3 disposed in front of main body 1.

As shown in FIG. 2, conventional CRT assembly 4 includes a CRT 10 for creating an image, a lens 20 for magnifying the image of CRT 10 to project it onto the screen 3, and a coupler 30 for coupling CRT 10 to lens 20. A cooling liquid receptacle 31 filled with a cooling liquid C by coupling CRT 10 to lens 20 is provided inside a frame of coupler 30. On a side of coupler 30 a cooling liquid pouring inlet 32 is disposed on a side of coupler 30 for pouring cooling liquid C into cooling liquid receptacle 31. A rubber buffer 40 and a holder cap 42 are connected to cooling liquid pouring inlet 32 so that cooling liquid C filled in cooling liquid receptacle 31 does not leak out when the volume of cooling liquid C is expanded by heat generated from CRT 10.

A flange portion 33 having a concave shape is provided for housing rubber buffer 40 connected to cooling liquid pouring inlet 32. With a rubber buffer 40 housed in flange portion 33, holder cap 42 presses a rim of rubber buffer 40 so that rim may be sealed and fastened to coupler 30

1 by a screw 44. Rubber buffer 40 as a diaphragm prevents cooling liquid C from flowing out of
2 flange portion 33, and when the cooling liquid C expands, it serves to control the pressure of cooling
3 liquid C contained in cooling liquid receptacle 31 while being elastically deformed away from flange
4 portion 33.

5 As described above, the conventional projection television CRT assembly includes flange
6 portion 33 housing rubber buffer 40 in coupler 30 and holder cap 42 fixed by screw 44 in order to
7 couple rubber buffer 40 to coupler 30. Thus, the manufacturing of coupler 30 is complicated, and
8 a separate cap holder 42 and screw 44 are required for coupling rubber buffer 40 to coupler 30.

9 Referring to FIGS. 3 and 4, a cathode-ray tube (CRT) assembly of a projection television
10 according to the present invention includes a CRT 50 producing an image, a lens 60 magnifying the
11 image of CRT 50 to project the image onto screen 3 of FIG 1, a coupler 70 coupling CRT 50 to lens
12 60, and an oilpack 80 coupled to coupler 70. CRT 50 and lens 60 are sealed by coupler 70 when
13 sealing members 51 and 61 are fixed between coupler 70 and CRT 50 or lens 60 through fixed
14 brackets 52 and 62 by screws, respectively.

15 Coupler 70 has two opened sides each facing one of lens 60 and CRT 50. This space
16 between the two opened sides and within coupler 70 is a cooling liquid receptacle 71 which will later
17 be filled with a cooling liquid C. A cooling liquid pouring inlet 72 is formed on an inlet member
18 76 of coupler 70 disposed on a third side of coupler 70 to provide a passageway for pouring cooling
19 liquid C into cooling liquid receptacle 71. Oilpack 80 is a bag-type pack made of two sheets of
20 flexible material, such as vinyl, the edges of which are fused together to form a closed portion 83

1 and an open end 82. An extended portion 98 of a pack holder 90 is welded to open end 82, and then
2 a supporting portion 95 of pack holder 90 is attached to cooling liquid pouring inlet 72 of coupler
3 70. During operation of the projection television, the temperature of cooling liquid C filled in
4 cooling liquid receptacle 71 increases to about 90°C due to heat generated by CRT 50. As the
5 temperature of cooling liquid C increases, the volume of cooling liquid C increases, and then the
6 pressure of cooling liquid receptacle 71 increases. The oilpack 80 receives an excessive portion of
7 cooling liquid C through cooling liquid pouring inlet 72 in order to reduce the pressure, thereby
8 preventing the pressure of cooling liquid receptacle 71 from increasing.

A through hole 91 is formed in a holding member 93, a supporting portion 95, and an
extended portion 98 of pack holder 90 so that cooling liquid C may flow from cooling liquid
receptacle 71 into the inside of closed end 83 of oilpack 80. A portion welded to the oilpack 80 is
preferably diamond-shaped for easy welding. In this embodiment, an oilpack coupling unit is
provided for simply fixing oilpack 80 to coupler 70 in one fixing step.

145/145 Referring to FIGS. 3 and 5, the oilpack coupling unit includes two protrusions 73 formed
on cooling liquid pouring inlet 72 and depressions 74 formed on a side of coupler 70, a pair of
16 guiding slots 92 including an axial slot 96 and a round slot 97, a holding portion 93, and a stopper
17 94 formed on supporting portion of pack holder 90. The protrusions 73 are projected toward a center
18 of cooling liquid pouring inlet 72. One or more depressions 74 are formed on inlet member 76 of
19 coupler 70 adjacent to cooling liquid pouring inlet 72, and preferably two depressions 74 are formed
20 symmetrically around cooling liquid pouring inlet 72 and receive corresponding stopper 94. Two

1 guiding slots 92 are disposed on opposite sides of pack holder 90 so that protrusions 73 are fitted
2 into axial slot 96 and round slot 97 when pack holder 90 is inserted into cooling liquid pouring inlet
3 72. Holding portion 93 projects out from guiding slot 92 so that pack holder 90 can be caught on
4 the protrusion 73 preventing separation from coupler 70 after axial slot 96 and round slot 97 of
5 guiding slot 92 receives protrusion 73 of cooling liquid pouring inlet 72.

6 When pack holder 90 is coupled to coupler 70, an o-ring 85 is provided between supporting
7 portion 95 of pack holder 90 and inlet member 76 of coupler 70 in order to prevent cooling liquid
8 C from leaking out through a crevice between pack holder 90 and cooling liquid pouring inlet 72.
9 Preferably, o-ring 85 is made of rubber material so that o-ring 85 may be elastically deformed when
10 pack holder 90 is coupled to coupler 70. In the course of coupling pack holder 90 to coupler 70, o-
11 ring 85 is elastically deformed and compressed between pack holder 90 and coupler 70. When the
12 coupling is complete, a repulsive force occurs due to elastic recovery tendency of rubber material,
13 so that pack holder 90 is pushed away from coupler 70. In this case, o-ring 85 maintains a sealed
14 state between pack holder 90 and coupler 70 while holding portion 93 is sealed with inlet member
15 76 and cooling liquid pouring inlet 72.

16 FIG. 6 is a cross-sectional view showing a pack holder coupled to a coupler according to
17 another embodiment of the invention. A pack holder 190 is formed so that a path of a through hole
18 191 communicating both cooling liquid receptacle 71 of coupler 70 and the inside of a closed portion
19 183 of an oilpack 180 is bent at a right angle within pack holder 190. Also, a hexagonal groove 195
20 is formed opposite to holding portion 93 of pack holder 190 coupled to inlet member 76 of coupler

1 70. An open end 182 of oil pack is attached to a bent portion 199 of pack holder 190.

2 If oilpack 180 is repeatedly expanded or contracted, the oilpack 180 can be damaged by
3 contact with coupler 70. For this reason, pack holder 190 is right-angled in order to prevent oilpack
4 180 from contacting coupler 70. Furthermore, when pack holder 190 is connected to coupler 70,
5 friction occurs due to the O-ring 85 sitting between holder back 190 and coupler 70. Thus, the
6 hexagonal groove 195 is formed so that a hexagonal wrench not shown may be used to rotate pack
7 holder 190 and couple to coupler 70.

8 In the projection television CRT assembly according to the invention having a structure as
9 described above, a bag-type oilpack 80, 180 is coupled to coupler 70 through pack holder 90, 190
10 in order to control the pressure of cooling liquid receptacle 71 formed within coupler 70. Thus,
11 when cooling liquid C held in the cooling liquid receptacle 71 expands as the temperature increases
12 with heat generated in CRT 50, cooling liquid C flows into oilpack 80, 180 through a through hole
13 91, 191 formed on pack holder 90, 190, thereby reducing the pressure of cooling liquid receptacle
14 71.

15 As described in the foregoing, a projection television CRT assembly according to the
16 invention includes a bag type oilpack for receiving cooling liquid contained in a cooling liquid
17 receptacle of a coupler as the temperature of the cooling liquid rises and the cooling liquid expands.
18 This makes it possible to prevent the pressure inside the cooling liquid receptacle from increasing,
19 thereby providing a reliable product. Furthermore, the CRT assembly is constructed such that the
20 oilpack is coupled and fixed to the cooling liquid pouring inlet of the coupler in one step using a

1 holder back, which simplifies assembling and reduces the member of required parts. Accordingly,
2 this reduction in the number of parts and assembling steps reduces the manufacturing cost.